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Animal Locomotion

An Electro-Photographic Investigation of Consecutive
Phases of Animal Movements

By
Eadweard Muybridge

Published under the Auspices of the University of
Pennsylvania

Prospectus
and
Catalogue of Plates

The Plates Printed by the Photo-Gravure Company of New York

Philadelphia, 1887
Printed by J. B. Lippincott Company



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ANIMAL LOCOMOTION

AN ELECTRO-PHOTOGRAPHIC INVESTIGATION
OF CONSECUTIVE PHASES OF
ANIMAL MOVEMENTS

BY
EADWEARD MUYBRIDGE

PUBLISHED UNDER THE AUSPICES OF THE
UNIVERSITY OF PENNSYLVANIA

PROSPECTUS
AND
CATALOGUE OF PLATES

THE PLATES PRINTED BY THE PHOTO-GRAVURE COMPANY OF NEW YORK

PHILADELPHIA
1887
PRINTED BY J. B. LIPPINCOTT COMPANY



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ANIMAL LOCOMOTION.

PROSPECTUS.

IN 1878 the author of the present work published a few Photographs under the title of "The Horse in Motion;" these were the results of some experiments in California with automatic electro-photographic apparatus, devised by him for the purpose of demonstrating the successive phases of Animal Locomotion. This subject had engaged his attention since 1872, when the first lateral photograph of a horse trotting at full speed was made by him.

The experiments were continued in 1879. Upon their termination the author became convinced that a comprehensive and systematic investigation with improved mechanical appliances, and newly-discovered chemical manipulations, would demonstrate many novel facts, not only interesting to the casual observer, but of indisputable value to the artist and to the scientist. This investigation demanded of necessity so large an outlay of money, and the subsequent publication in its present generous form assumed such imposing proportions, that all publishers not unnaturally shrank from entering the unexplored field.

In this emergency The University of Pennsylvania took the prosecution of the investigation under its auspices, and its liberal assistance has enabled the author to complete his work, which he hereby announces as ready for publication.

THE WORK WILL BE PUBLISHED EXCLUSIVELY BY SUBSCRIPTION, AT THE PRICE OF ONE HUNDRED DOLLARS FOR EACH COPY.

ONE HUNDRED PLATES OF ILLUSTRATIONS WILL CONSTITUTE A COPY OF THE WORK.

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In the Title of the work, the term "Locomotion" is stretched to its broadest capacity.

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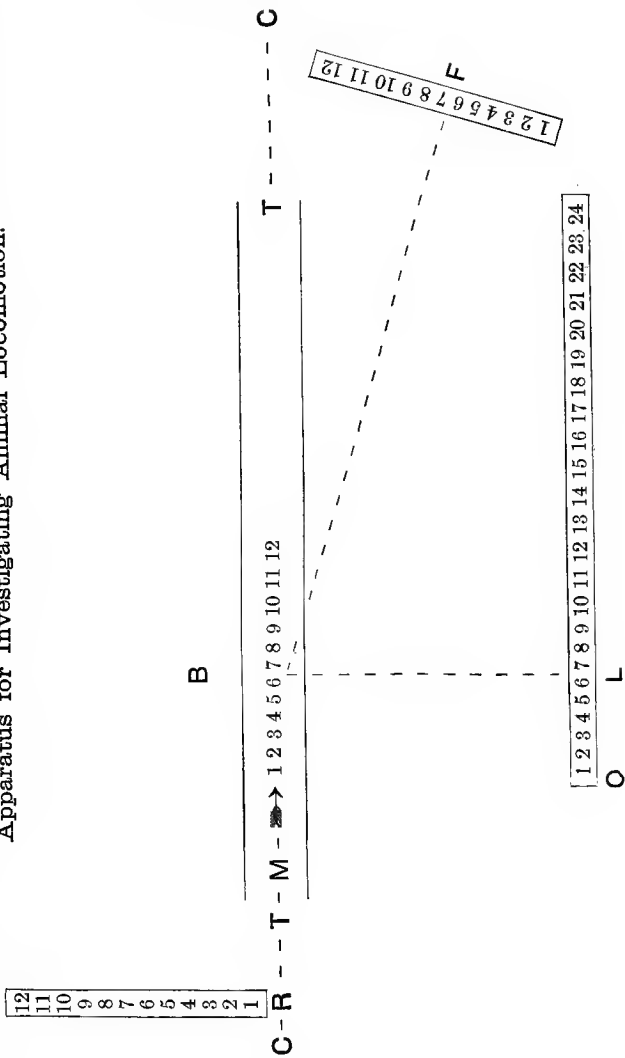
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EADWEARD MUYBRIDGE,

University of Pennsylvania,

Philadelphia, U.S.A.

Diagram of the Studio at The University of Pennsylvania, and Arrangement of the Apparatus for Investigating Animal Locomotion. 63



STUDIO, APPARATUS, AND METHOD OF WORKING.

In the diagram, B is the *Lateral* background; consisting of a shed 37 metres, or about 120 feet, long, the front of which is open, and divided by vertical and horizontal threads into spaces 5 centimetres, or about 2 inches, square, and by broader threads into larger spaces 50 centimetres, or about 19 $\frac{3}{4}$ inches, square.

At C and C, 37 metres, or about 120 feet, apart are "*fixed*" backgrounds, with vertical threads 5 centimetres, or about 2 inches, from their centres, with broader threads 30 centimetres, or about 12 inches, from their centres.

For some investigations, readily distinguishable in the plates, "*portable*" backgrounds are used, consisting of frames 3 metres wide by 4 metres high,—about 10 feet by 13 feet 4 inches,—over some of which black cloth and over others white cloth is stretched, all being divided by vertical and horizontal lines into square spaces of the same description as those of the lateral background.

These portable backgrounds are used when photographing birds and horses, and also wild animals when possible to do so.

L. A lateral battery of 24 automatic electro-photographic cameras, arranged parallel with the line of progressive motion, and usually placed therefrom about 15 metres or 49 feet.

Slow movements are usually photographed with lenses of 3 inches diameter and 15 inches equivalent focus; the centres of the lenses being 15 centimetres, or about 6 inches, apart.

Rapid movements are photographed with a *portable* battery of cameras and smaller lenses.

The centre, between lenses 6 and 7, is opposite the centre of the track T.

For illustrations comprising both "Laterals" and "Fore-shortenings," cameras 1 to 12 only are used.

When "Laterals" alone are required, cameras 13 to 24 are connected with the system and used in their regular sequence.

R. A portable battery of 12 automatic electro-photographic cameras, the lenses of which are $1\frac{1}{2}$ inches diameter and 5 inches equivalent focus; the lenses are arranged $7\frac{1}{2}$ centimetres, or about 3 inches, from their centres. When the battery is used vertically, lens 6 is usually on the same horizontal plane as the lenses of the lateral battery.

In the diagram this battery is arranged *vertically* for a series of "Rear Foreshortenings"; the points of view being at an angle of 90° from the lateral battery.

F. A battery of 12 automatic electro-photographic cameras, similar to that placed at R, arranged horizontally for a series of "Front Foreshortenings"; the points of view averaging an angle of 60° from the lateral battery.

O. The position of the operator; the electric batteries; the chronograph for recording the intervals of time between each successive exposure; the motor for completing the successive electric circuits, and other apparatus connected with the investigation.

T T. The track parallel with the lateral battery and covered with corrugated rubber flooring.

M. The model, approaching the point number "1" on the track where the series of photographic illustrations will commence.

An estimate having been made of the interval of time which will be required, between each photographic exposure, to illustrate the complete movement, or that portion of the complete movement desired, the apparatus is ad-

justed to complete a succession of electric circuits at each required interval of time, and the motor is set in operation. When the series is to illustrate *progressive* motion; upon the arrival of the model at the point marked "1" on the track, the operator, by pressing a button, completes an electric circuit, which immediately throws into gearing a portion of the apparatus hitherto at rest. By means of suitably-arranged connections, an electric current is transmitted to each of the 3 cameras marked "1" in the various batteries, and an exposure is simultaneously made on each of the photographic plates, respectively, contained therein. At the end of the predetermined interval of time, a similar current is transmitted to each of the cameras marked "2," and another exposure made on each of the 3 next plates, and so forth until each series of exposures in each of the three batteries is completed. Assuming the operator to have exercised good judgment in regulating the speed of the apparatus, and in making the first electric contact at the proper time, and that the figures 1 to 12 represent the distance traversed by the model in executing the movement desired, the first three photographic exposures—that is, one exposure in each battery—will have been synchronously made when the model was passing the position marked "1" on the track T; the second three exposures will have been made when the model was passing the position marked "2," and so on until twelve successive exposures were simultaneously made in each of the three batteries. This perfect uniformity of time, speed, and distance, however, was not always obtained.

ANALYSIS OF THE PLATES.

Of the broader horizontal lines seen in the plates, the second from the ground is (excepting in special instances

easily recognized) on the same horizontal plane as the lenses of the lateral battery of cameras hereafter described.

The numbers on the background of the lateral illustrations are 15 centimetres, or about 6 inches, apart from each of their centres.

The plan adopted to facilitate analysis of the various movements may be exemplified by a reference to plate 14.

The model "8" is walking towards the right, the *quantity* of movement illustrated is two steps, or one stride. Twelve successive phases of that movement were photographed synchronously from each of the three points of view, L, R, and F in the diagram. The interval of time between each of the twelve phases was about one-eighth of a second, or according to the chronograph one hundred and twenty one-thousandth parts of a second (0.120"), the complete movement having been accomplished in about one and a half seconds.

The number of figures on the plate is 36, arranged thus:



												Laterals.
1	2	3	4	5	6	7	8	9	10	11	12	
												Rear Foreshortenings from points of view on the same vertical line, at an angle of 90° from the Laterals.
1	2	3	4	5	6	7	8	9	10	11	12	
												Front Foreshortenings from points of view on the same horizontal plane, at angles averaging 60° from the Laterals.
1	2	3	4	5	6	7	8	9	10	11	12	

A similar method of arrangement prevails in all those plates which illustrate a movement, as seen simultaneously from each of three points of view.

When the illustrations are, respectively, from one or two points of view only, a system of arrangement is adopted

which is considered the most convenient for their especial comparative examination.

The successive phases of movement are usually arranged in the plates to conform with the direction of the first phase illustrated.

If, for example, the motion of the first phase is towards the right, the arrangement of each succeeding phase is thus:  1 2 3, etc. If, however, the motion of the first phase is towards the left, the arrangement of the successive phases is thus: etc., 3 2 1. 

When two or more distinct series of illustrations are included in one plate, each separate series is distinguished by the letters A, B, C, etc.

Each series, of the plates numbered 520 to 528, inclusive, illustrates a single phase of motion, photographed synchronously from each of six points of view.

In some instances it will be found that the number of phases of motion from each of the respective points of view do not correspond, some being omitted. This arises from the loss of negatives during manipulation. The subject being, perhaps, one of interest or importance, and impossible to duplicate, it has been included in the work notwithstanding the deficiency.

Serial numbers connected with a brace indicate that one and the same series of phases is illustrated in two plates, the laterals being in one plate, and the foreshortenings in another.

Although, as before stated, the broadest interpretation has been given in this investigation to the word Locomotion, it is not assumed that a response to every possible inquiry in this inexhaustible subject will be found in this work.

MODELS.

A few particulars in reference to some of the human models, will assist subscribers in the selection of their plates.

The greater number of those engaged in walking, running, jumping, and other athletic games are students or graduates of The University of Pennsylvania,—young men aged from eighteen to twenty-four,—each one of whom has a well-earned record in the particular feat selected for illustration.

The mechanics are experts in their particular trades, and the laborers are accustomed to the work in which they are represented as being engaged.

Unless otherwise described the arms of the models in the progressive movements are in a position naturally consistent with the movement.

Each model is distinguished by a number, and may be recognized by that number throughout the work. The male models are numbered with bold-faced type, thus: "45," and the females with light-faced type, thus: "8."

The models 52, 64, 65, and 66 are teachers in their respective professions; 60 is a well-drilled member of the State Militia; 51, a well-known instructor in art; 95, an ex-athlete, aged about sixty; 22, a mulatto and professional pugilist; 27, 28, and 29, boys aged thirteen to fifteen; 42 and 49, public acrobats; 17, 19, 21; 74 to 91, inclusive; 92 and 94 were patients of the University and Philadelphia Hospitals, selected to illustrate abnormal locomotion.

The female models were chosen from all classes of society.

Number 1, is a widow, aged thirty-five, somewhat slender and above the medium height; 3, is married, and heavily built; 4 to 13, inclusive, 15 and 19, are unmarried, of ages varying from seventeen to twenty-four; of these, 11 is

slender; the others of medium height and build; 14, 16, and 93, are married; 20, is unmarried, and weighs three hundred and forty pounds.

The endeavor has been in all instances to select models who fairly illustrate how—in a more or less graceful or perfect manner—the movements appertaining to every-day life are performed.

In the column headed "COSTUME," the state of the model with regard to apparel is represented by

- N. Nude. When any one figure is *nude*, the entire series is so classified.
- S. N. Semi-Nude. The model so designated is usually clothed with a light or transparent drapery from the waist to the knees, or to the ground: in some illustrations of the toilet it also includes more or less underclothing.
- P. C. Pelvis Cloth. A strip of cloth surrounds the lower part of the abdomen.
- T. D. Transparent Drapery. The model is attired in a flowing garment of diaphanous texture, which permits the action of the limbs to be seen, and the conformation of the folds of the drapery thereto.
- D. Draped. Fully clothed.
- B. F. Bare Feet. The costume of peasant girls with the legs below the knees, and the feet bare.

ANIMALS AND BIRDS.

The wild animals and birds were photographed in the gardens of the Zoölogical Society, of Philadelphia, by the courtesy of its Trustees and Superintendent.

Nearly all the horses and other domesticated animals were photographed at the Gentlemen's Driving Park, and are good representatives of their various classes and movements.

ANGLES OF VIEW.

In the classification of the illustrations into "Laterals" and "Foreshortenings," the term Lateral applies—with a few exceptions—to those figures photographed with the *lateral* battery of cameras, as described in the diagram. And the term "Foreshortenings" is applied to all the figures made from points of view at varying angles from the lateral battery, regardless of the actual position of the model.

The points of view, described as being in their relation to the laterals at the respective angles of 90 and 60 degrees, are strictly speaking not always so, but as close thereto as careful measurement and circumstances permitted. All stated angles of view, as applied to wild animals and birds, are simply approximate.

The terms "Front" or "Rear," as applied to the Foreshortenings, usually refers to the position of the model when the *first* exposure is made in the respective batteries. In the execution of some movements, the model turns completely around before the series of photographs is finished; the latter phases of motion may therefore be included in the column of "Front" views when they are actually "Rear" views. The character of the movement will of itself explain the relative successive positions of the model, and the illustrations afford ample means of determining the angular relationship to all points of view.

MOVEMENTS AND TIME.

In the column devoted to "The *quantity* of movement," a completed action or a round movement is designated by the number "1." A "round movement" means a movement which, being completed, restores the body and limbs to the approximately relative position they occupied at its

commencement. For a horse trotting, or for a man walking, for example, it means the execution of two steps; for a horse jumping a hurdle, or for a man who, when batting, strikes a base-ball, it means the execution of the main object of the particular investigation.

The word approximate is used, because it rarely happens that the execution of regular movements by the most carefully-trained man or animal restores the body and limbs to precisely the same original relative position. When a movement is susceptible of being divided into two parts, of which the second part, with a change of the limbs, is virtually a repetition of the first part; it is not always considered necessary to include the round movement in the illustrations; but in order that the relationship which each one-half of the movement holds to the other half may be understood, five-eighths or three-fourths (designated in the column 5-8 or 3-4) of a round movement is usually illustrated. The quantity of movement given in the column is frequently only approximate to the *exact* quantity.

In the appropriate column, the interval of time between each successive exposure is stated in one-thousandth parts of a second, as recorded by a chronograph with a tuning-fork making 100 single vibrations in a second.

The duration of each interval of time between each successive exposure has been carefully examined, and when, from any obscurity in the pen-markings, or from other causes, the exact intervals of time could not be positively ascertained, an average interval of time has been computed, and attention called thereto in the column of reference notes.

It may be stated, as a matter of some interest, that from carefully-executed experiments it was proved at the University Studio that the most rapid exposures were made in periods of time varying from the one two-thousandth to the one five-thousandth of a second. With such exposures

details of black and of white drapery were obtained. The use, however, of such very brief exposures was deemed inadvisable, and for the illustrations of the movements of large animals was in practice wholly needless.

For photographs of horses at full speed an exposure of the one six-hundredth or of the one eight-hundredth of a second will usually obtain the necessary sharpness of outline and all essential details.

For slow movements an exposure of the one one-hundredth or of the one two-hundredth of a second will give all desirable results.

REFERENCE NOTES.

1. The interval of time between each phase is an *average* of the intervals of time between all the phases, or an approximation thereto.

2. No record of intervals of time between phases.

3. Isolated phases, photographed synchronously from the various points of view.

4. Successive phases, photographed at *irregular* intervals of time synchronously from the various points of view.

5. The model has a rod attached to the hips to aid the measurement of their oscillations.

In all illustrations of this number the lenses of the lateral battery are on the same horizontal plane as the platform on which the model is walking, or, if ascending or descending, about midway between the two planes of height on which the feet are placed. The backgrounds are those described as "Portable."

6. The lenses of the lateral battery are on the same horizontal plane as the platform on which the model is walking. The backgrounds are those described as "Portable."

7. Isolated phases of motion from a single point of view.
8. A combination of 2 serials, with the same average interval of time between each successive phase.
9. One phase of this series is substituted by a corresponding phase from another series.
10. A combination of 2 serials.
11. Foreshortenings incomplete.
12. Foreshortenings irregular.
13. A double interval of time occurs between phases 2 and 3.
14. A double interval of time occurs between phases 3 and 4.
15. A double interval of time between phases 4 and 5.
16. A double interval of time between phases 5 and 6.
17. A double interval of time between phases 7 and 8.
18. A double interval of time between phases 8 and 9.
19. A double interval of time between phases 10 and 11.
20. A double interval of time, respectively, between phases 4 and 5; 9 and 10.
21. A double interval of time, respectively, between phases 5 and 6; 7 and 8.
22. A double interval of time, respectively, between phases 5 and 6; 9 and 10.
23. Five of the regular intervals of time between phases 6 and 7.
24. Five of the regular intervals of time between phases 5 and 6.

RETROSPECTIVE.

In conclusion, it may not be irrelevant for the author to remark that a number of his early experimental photographs of animal movements, and his original Title, "The Horse in Motion," were copied, and published a few years ago, in a book which is referred to in the following para-

graph, reprinted from *Nature* (London), June 29, 1882. After the full Title of the book is quoted, the reviewer says, "The above is the somewhat long title of a large and important work issuing from the well-known Cambridge (U. S.) University Press.

"Long as is the title, the name of the principal contributor to the volume is left unrecorded there; though, indeed, even a cursory glance over its contents shows how much indebted is the whole question of the mode of motion in the horse to the elaborate series of investigations of Mr. Muybridge."

E. M.

UNIVERSITY OF PENNSYLVANIA,

January, 1887.

ANIMAL LOCOMOTION
CATALOGUE

CATALOGUE OF PLATES.

Serial Number.	MOVEMENTS.	No. of Model.	Males in Bold-faced Type, Females in Light-faced Type.	Costume.	Phases of Movement Illustrated.						Quantity of Movement.	Time Intervals in One-Thousandths of a Second.	Reference Notes.
					Laterals.		Front.		Rear.				
					Foreshortenings at Angles from Laterals.								
					90°	60°	90°	60°	90°	60°			
1	Walking	36		N	12	12	12	12	12	12	5-8	69	
2	"	46		N	12	12	12	12	12	12	9-10	90	
3	"	46		PC		9				9	3-4	69	
4	"	46		N	8	8	8	8	8	8	1-2	48	
5	"	46		N	8	8	8	8	8	8	5-8	83	
6	"	22		N	12	12	12	12	12	12	5-8	75	
7	"	29		N	12	12	12	12	12	12	3-4	54	6
8	"	55		PC	8	8	8	8	8	8	1-2	71	6
9	"	56		PC	8	8	8	8	8	8	1-2	74	6
10	"	26		N	6	6	6	6	6	6	1-2	88	
11	"	24		N	12	12	12	12	12	12	1	88	
12	"	27, 28		N	12	12	12	12	12	12	1-2	48	
13	"	1		N	12	12	12	12	12	12	1	95	
14	"	8	right hand at chin	N	12	12	12	12	12	12	1	120	
15	"	2		N	10	10	10	10	10	10	5-8	103	
16	"	4		N	10	10	10	10	10	10	5-8	91	
17	"	6		N	12	12	12	12	12	12	3-4	94	
18	"	8	left hand across abdomen	N	12	12	12	12	12	12	3-4	99	
19	"	20	commencing to turn around	N	12	12	12	12	12	12	1-2	129	12

20	Walking, right elbow bent	7	N	12	12	12	12	8-4	91	5
21	“ both elbows bent	7	N	12	12	12	12	1	106	5
22	“ with high-heeled boots on	1	N	12	12	12	12	1	98	..
23	“ right hand at chin, high-heeled shoes on	8	N	12	12	12	12	1	121	..
24	“ with high-heeled shoes on	3	N	12	12	12	12	1	108	..
25	“ “ “ “ “ “ “ “	7	N	12	12	12	12	1	95	6
26	“ carrying 75-lb. stone on left shoulder	46	PC	9	9	9	9	1-2	75	..
27	“ “ “ head, hands raised	46	N	12	12	12	12	3-4	92	6
28	“ 50-lb. dumb-bell in right hand	46	N	12	12	12	12	3-4	99	6
29	“ bucket of water in each hand	46	N	12	12	12	12	3-4	90	6
30	“ “ “ “ “ “ “ “	31	N	12	12	12	12	3-4	97	..
31	“ 75-lb. stone on right shoulder	46	PC	9	9	9	9	5-8	104	..
32	“ bucket of water in each hand	1	N	12	12	12	12	1	98	..
33	“ 14-lb. basket on head, hands raised	1	N	12	12	12	12	1	92	..
34	“ 15-lb. basket on head, hands raised	7	N	12	12	12	12	3-4	89	6
35	“ “ child (70) on right arm	12	SN	12	12	12	12	1	102	..
36	“ “ child on left arm	93	D	12	12	12	12	1	150	..
37	“ left hand holding dress, right hand at face	13	TD	12	12	12	12	3-4	123	..
38	“ opening parasol	3	D	12	12	12	12	1	154	..
39	“ hands engaged in knitting	12	TD	12	12	12	12	1-2	178	..
40	“ throwing handkerchief over shoulders	13	N	12	12	12	12	3-4	154	..
41	“ flirting a fan	8	TD	12	12	12	12	1	115	..
42	“ pouring water from pitcher	7	N	11	11	11	11	9-10	142	..
43	“ sprink'g water from basin, turn'g around	8	N	8	8	8	8	1	191	..
44	“ taking off hat	23	D	12	12	12	12	5-8	87	..
45	“ two models meeting, and partly turning	4,16	D	24	24	24	24	2	78	..
46	“ flirting a fan, and turning around	10	N	12	12	12	12	1	350	..
47	“ and turning around	7	N	12	12	12	12	1	165	6
48	“ “ “ bouquet in both hands	5	D	12	12	12	12	1	172	..

ANIMAL LOCOMOTION.

Serial No.	MOVEMENTS.	Model.	Costume.	Laterals.	Foreshortenings.				Quantity.	Time.	Notes.
					Front.		Rear.				
					90°	60°	90°	60°			
49	Walking and turning around rapidly, a satchel in one hand, cane in other	43	D	12	.	12	.	1	127	.	
50	and turning around, carrying bucket of water in left hand	12	S N	12	.	.	12	1	172	.	
51	turning around, using sprinkling pot.	8	N	11	.	.	11	1	211	15	
52	carrying child, turning around; another child (70) holding on to dress of 93	93	D	12	.	.	.	1	182	1	
53	scattering flowers and turning around	12	S N	12	.	.	12	1	367	.	
54	two models (one flirting a fan), arm in arm, turning around	1, 8	N	12	.	.	12	1	151	.	
55	turning around, action of aversion	12	T D	11	.	.	11	1	228	13	
56	" and stooping to lift train	12	T D	12	.	.	12	1	162	.	
57	" around, 10-lb. basket on head	7	B F	12	.	.	12	1	219	.	
58	" " sweeping the floor	1	N	12	.	.	12	1-2	174	.	
59	Starting for a run (shoes)	37	P C	12	.	.	12	1	93	.	
60	Running at a half-mile gait (shoes)	37	P C	10	.	.	10	5-8	42	.	
61	full speed (imperfect action, shoes)	37	P C	8	.	.	8	1-2	36	.	
62	" "	37	N	12	.	.	12	1	41	.	
63	" "	46	N	10	.	.	10	5-8	39	1	
64	" "	33	N	12	.	.	12	5-8	28	.	
65	" "	33	N	8	.	.	8	1-2	29	.	
66	" "	55	N	8	.	7	.	1-2	57	.	
67	" "	47	N	8	.	8	.	5-8	56	.	
68	" "	46	N	9	.	9	.	1-2	38	.	
69	" two models	27, 28	N	10	.	10	.	1	62	.	
70	" "	8	N	10	.	8	.	5-8	61	.	

CATALOGUE OF PLATES.

71	Running	7	T D		12		1	100
72	“ leading child (70) hand in hand	12	T D	12	5	12	1	93
73	Turning around in surprise and running away	8	N	5	12	12	1	289
74	Ascending incline, angle 1 in 4	36	N	12	12	12	11-2	168
75	“ “	24	N	9	12	9	1	122
76	“ “	8	N	12	12	12	3-4	136
77	“ “	3	N	12	12	12	1	112
78	“ “ flirting a fan	1	N	12	12	12	5-8	98
79	“ “	7	N	12	12	12	1	110
80	“ “ 20-lb. basket on head	1	N	11	11	11	1-2	71
81	“ “ bucket of water in each hand	1	N	12	12	12	1-2	70
82	“ “ “ “ “	8	N	12	12	12	1	127
83	“ “ “ “ “ right	2	N	12	12	12	1	153
84	“ “ “ “ “	7	N	12	12	12	5-8	89
85	“ “ (wearing shoes)	8	N	12	12	12	3-4	137
86	“ “ “ “	3	N	12	12	12	1	103
87	“ “ bucket water each hand (shoes)	8	N	12	12	12	1	128
88	“ “ stairs	36	N	11	11	11	1	128
89	“ “	39	N	12	12	12	3-4	84
90	“ “	24	N	10	10	10	1	132
91	“ “	22	N	12	12	12	1	86
92	“ “	2	N	12	12	12	3-4	100
93	“ “	7	N	12	12	12	1	110
94	“ “ looking around; basin in hands	2	N	12	12	12	1	147
95	“ “ a basin in hands	3	D	12	12	12	1	92
96	“ “ looking round, waving hand chief	7	N	12	12	12	1	239
97	Turning to ascend stairs, with a pitcher and goblet in hands	8	T D	12	12	12	1	161
98	Turning and ascending stairs	7	N	12	12	12	1	284
99	“ “ “ “	6	N	12	12	12	1	175
100	“ “ “ “	5	D	12	12	12	1	196

Serial No.	MOVEMENTS.	Model.	Costume.	Laterals.	Foreshortenings.				Quantity.	Time.	Notes.
					Front.		Rear.				
					90°	60°	90°	60°			
101	Turning and ascending stairs, waving hand . . .	7	N	11	11	11	11	1	308	.	
102	Turning, ascending stairs, bucket water in r. hand	7	N	11	11	11	11	1	325	.	
103	Turning and ascending stairs, pitcher and goblet in hands	4	N	12	12	12	12	1	295	.	
104	Turning, ascending stairs, bucket water in ea. hand	4	N	12	12	12	12	1	266	.	
105	“ “ water jar on left shoulder	12	S	12	12	12	12	1	446	.	
106	to ascend “ bucket water in ea. hand	3	N	12	12	12	12	1	165	.	
107	Turning to ascend stairs, bucket of water and broom in hands	4	D	12	12	12	12	1	221	.	
108	Turning to ascend stairs; stooping, lifting a pitcher	8	N	12	12	12	12	1	206	.	
109	Ascending step-ladder	26	N	12	12	12	12	1	108	.	
110	“ “ two steps at a time	8	N	11	11	11	11	1-2	107	18	
111	“ ladder	30	N	11	11	11	11	1-2	95	16	
112	“ “	8	N	12	12	12	12	1-2	127	.	
113	Descending incline, angle 1 in 4	24	N	12	12	12	12	1	84	.	
114	“ “	36	N	12	12	12	12	1	103	.	
115	“ “ with hands clasped in front	7	N	12	12	12	12	1-2	90	1, 6	
116	“ “ one hand on chin	8	N	12	12	12	12	1	128	.	
117	“ “	1	N	12	12	12	12	1	91	.	
118	“ “	7	N	12	12	12	12	1	109	5	
119	“ “ right hand on breast (shoes)	8	N	12	12	12	12	1	129	.	
120	“ “ bucket of water in right hand	2	N	12	12	12	12	1-2	143	.	
121	“ “ “ each “	1	N	12	12	12	12	1	105	.	
122	“ “ “ “	8	N	12	12	12	12	1-2	129	.	
123	“ “ 20-lb. basket on head, hands raised	1	N	12	12	12	12	3-4	91	.	

Serial No.	MOVEMENTS.	Model.	Costume.	Laterals.	Foreshortenings.				Quantity.	Time.	Notes.
					Front.		Rear.				
					90°	60°	90°	60°			
151	Descend'g step-ladder, turn'g around, rock in hands	26	N	10	.	10	.	1	135	.	
152	Jumping; running straight high jump (shoes)	37	P C	12	.	12	.	1	87	.	
153	" " " " " "	37	P C	12	.	12	.	1	63	.	
154	" " " " " "	26	N	12	.	12	.	1	125	.	
155	" " " " " "	8	N	12	.	12	12	1	103	.	
156	" " " " " "	4	D	20	.	.	.	1	105	.	
157	" " twist " " (shoes)	37	P C	12	.	12	.	1	152	.	
158	" " " " " "	37	P C	12	.	12	.	1	160	.	
159	" " broad jump (shoes)	37	P C	12	.	12	.	1	95	.	
160	" " " " " "	37	P C	8	.	8	.	1	161	.	
161	" " standing high " " " "	40	P C	12	.	12	12	1	139	.	
162	" " broad " " " "	40	P C	12	.	12	12	1	156	.	
163	" " " " (shoes)	37	P C	12	.	12	.	1	156	.	
164	" " pole vaulting " " " "	45	N	11	.	.	11	1	.	.	
165	" " " " " "	46	N	12	.	12	12	1	.	.	
166	" " over man's back (leap-frog)	54	N	12	.	12	.	1	146	.	
167	" " boy's " " " "	28	N	10	.	9	.	1	109	.	
168	" " " " " "	27	N	12	.	12	.	7-8	87	.	
169	" " " " " "	29	D	18	.	.	.	1	107	.	
170	" " from stone to stone across a brook	12	S N	12	.	12	12	1	119	.	
171	Stepping up on a trestle; jumping down, turning	8	N	12	.	12	12	1	289	.	
172	" " " " " "	12	T D	12	.	12	.	1	290	.	
173	Ascending steps and jumping off	4	D	24	.	.	.	1	234	.	
174	Running and jumping with skipping-rope	12	S N	12	.	12	.	1	104	.	
175	Crossing brook on step-stones with fishing-pole and can	12	S N	12	.	12	12	1	1-2	152	

176	Crossing brook on step-stones, with fishing-pole and basket	7	N	10	10	10	83	1-2	83
177	Crossing brook on step-stones, with fishing-pole and basket	7	N	10	10	10	118	5-8	118
178	Stepping on and over a trestle	7	N	12	12	12	248	1	248
179	Stepping on and over a rock, a basket on head, right hand raised	12	S N	12	12	12	129	1-2	129
180	Stepping on and over a chair	7	N	12	12	12	242	1	242
181	“ over a fence	12	S N	12	12	12	169	1	169
182	Crawling on hands and knees	8	N	12	12	12	88	1	88
183	{ Walking on hands and feet	8	N	12	12	12	106	1	106
184	{ “ “ “	8	N	12	12	12	106	1	106
185	Hopping on left foot	12	S N	8	8	8	141	2	141
186	“ “ right foot	82	N	12	12	12	81	2	81
187	{ Dancing (fancy)	12	T D	12	12	12	277	1	277
188	{ “ “ “	12	T D	12	12	12	277	1	277
189	{ “ “ “	12	T D	12	12	12	277	1	277
190	Dancing (nautch)	12	S N	12	12	12	192	1	192
191	{ “ “ “	12	S N	12	12	12	244	1	244
192	{ “ “ “	12	T D	12	12	12	211	1	211
193	{ “ “ “	12	T D	12	12	12	200	1	200
194	{ “ “ “	7	T D	12	12	12	200	1	200
195	{ “ “ “	7	T D	10	10	10	146	1	146
196	{ “ “ “	7	N	12	12	12	207	1-2	207
197	{ “ “ “	1, 8	N	12	12	12	81	1-2	81
198	{ “ “ “	58, 7	D	24	24	24	246	1	246
199	{ “ “ “	14	D	11	11	11	211	1	211
200	{ “ “ “	5	D	12	12	12	220	1	220
201	Courtesying	7	B F	10	10	10	158	1	158
202	“ “ fan in right hand	1	N	12	12	12	223	1	223
	“ “ kissing hand and turning around	7	N	11	11	11		1	
	Taking 12-lb. basket from head, putting it on the ground	1	N	12	12	12		1	
	Dropping and lifting handkerchief	7	N	11	11	11		1	

Serial No.	MOVEMENTS.	Model.	Costume.	Laterals.	Foreshortenings.				Quantity.	Time.	Notes.
					Front.		Rear.				
					90°	60°	90°	60°			
203	Bending over a trestle with water-jar	8	N	12	12	12	12	1	350	.	
204	Stooping to pick up ball	6	N	12	12	12	12	1	167	.	
205	Carrying and stooping with vase	12	T D	12	12	12	12	1	278	1	
206	Carrying water-jar on head, turning and placing it on the ground	8	T D	12	12	12	12	1	220	.	
207	Stooping and lifting train	98	D	12	12	12	12	1	204	.	
208	Dropping a fan and stooping to lift it	98	D	12	12	12	12	1	155	.	
209	Stooping and lifting a handkerchief	5	D	12	12	12	12	1	345	.	
210	" " dress; a fan in left hand	4	D	12	12	12	12	1	218	.	
211	" " " hand'chief; parasol in l. hand	14	D	12	12	12	12	1	237	.	
212	Dropping broom and lifting bucket of water	4	D	11	11	11	11	1	272	17	
213	Lifting and emptying basket	1	N	12	12	12	12	1	232	.	
214	" child (70) from the ground, turning around	12	S N	12	12	12	12	1	311	.	
215	Placing child (70) on the ground, child running off	12	S N	12	12	12	12	1	290	.	
216	Bending to fill water-jar; placing jar on head	8	T D	12	12	12	12	1	376	.	
217	Stooping, lifting, and carrying 30-lb. basket	7	B F	12	12	12	12	1	200	.	
218	" and lifting full demijohn to shoulder	39	N	12	12	12	12	1	237	.	
219	" " broom and sweeping	7	N	12	12	12	10	1	325	1	
220	" " handkerchief and turning	2	N	12	12	12	12	1	173	.	
221	" " 12-lb. basket to head	1	N	12	12	12	12	1	245	.	
222	" " water-jar to head and turning	7	N	12	12	12	12	1	273	1	
223	" " basin, wiping it, and turning	8	N	8	8	8	8	1	359	.	
224	" " water-jar to head	4	N	12	12	12	12	1	268	10	
225	Removing water-jar from shoulder to the ground	4	N	12	12	12	12	1	532	1.10	
226	Removing water-jar from shoulder to the ground and turning	6	N	12	12	12	12	1	498	.	

227	Lifting cloth from the ground, placing it around shoulders, and turning	4	N	12	12	12	1	368
228	Turning and lifting water-jar from the ground	6	N	12	12	1	1	297
229	Placing basket on the ground and turning	1	T D	12	12	1	1	328
230	Lifting 30-lb. basket from ground to head, turning	7	B F	12	12	1	1	282
231	Stooping to arrange train and turning	5	D	12	12	3-4	1	165
232	“ “ lift	12	S N	12	12	1	1	196
233	Lifting shawl, putting around shoulders, turning	8	T D	12	12	1	1	271
234	Lifting and emptying basin of water and turning	7	B F	12	12	1	1	469
235	Turning and removing water-jar from shoulder to the ground	7	N	12	12	1	1	278
236	Placing chair and sitting down	3I	N	12	12	1	1	183
237	Sitting down on chair and opening fan	7	N	12	12	1	1	281
238	Sitting on chair, crossing legs, drinking from teacup	8	N	12	12	1	1	270
239	Two models; one standing, the other sitting, crossing legs	10, 11	N	8	8	8	1	330
240	Sitting and flirting a fan	5	D	9	9	1	1	492
241	Placing chair, sitting and reading	5	D	12	12	1	1	307
242	“ “ flirting a fan	12	T D	12	12	1	1	364
243	“ “ and sitting, parasol in left hand	3	D	12	12	9-10	1	296
244	Sitting, crossing legs, filling goblet from pitcher	8	N	8	8	1	1	384
245	Two models, turning around, sitting on the ground	10, 11	N	12	12	1	1	350
246	Placing chair, sitting and flirting a fan	12	T D	10	10	1	1	241
247	Sitting down, placing feet on chair	8	N	9	9	1	1	291
248	Sitting down on the ground	12	S N	12	12	1	1	232
249	Rising from chair	3I	N	10	10	1	1	92
250	“ “ stooping and lifting hand/chief	5	D	12	12	1	1	312
251	Kneeling on left knee, basket in l. hand, and rising	8	N	12	12	1	1	286
252	“ “ right knee and scrubbing the floor	8	N	12	12	1	1	334
253	“ “ elbows on chair, hands clasped	12	T D	12	12	1	1	364
254	“ “ “ “ “ “	8	N	12	12	1	1	291

Serial No.	MOVEMENTS.	Model.	Costume.	Laterals.	Foreshortenings.				Quantity.	Time.	Notes.
					Front.		Rear.				
					90°	60°	90°	60°			
255	Arising from kneeling and turning	8	N	12	12	12	12	1	179		
256	Lying on the ground and reading	8	N	12	12	12	12	1	340		
257	" "	39	N	10	10	10	10	1	106		
258	Arising from the ground and walking off	39	N	10	10	10	10	1	193	13	
259	Lying on a couch and turning over on side	47	N	10	10	10	10	1	264		
260	Arising from couch and stretching arms	47	N	10	10	10	10	1	245		
261	Getting into hammock	8	N	10	10	10	10	1	375		
262	" out of hammock	8	N	12	12	12	12	1	211		
263	" into bed	8	N	12	12	12	12	1	367		
264	" out of bed and preparing to kneel	8	N	12	12	12	12	1	290		
265	" "	1	T.D	9	9	9	9	1	387	4	
266	Turning and changing position while on the ground	7	N	8	8	8	8	1		4	
267	" " " "	7	T.D	7	7	7	7	1		4	
268	Arising from the ground	20	N	8	8	8	8	1		4	
269	" " " with newspaper in l. hand	4	N	10	10	10	10	1	309		
270	" " " pamphlet	8	N	12	12	12	12	7-8	218		
271	" " " a paper	12	S.N	12	12	12	12	1	381		
272	Stumbling and falling on the ground	8	N	12	12	12	12	1	161		
273	Base-ball; pitching	25	N	10	10	10	10	1	108		
274	" " " (low ball)	30	N	12	12	12	12	1	85		
275	" " " "	30	N	12	12	12	12	1	47		
276	" " " "	25	N	8	8	8	8	1	58		
277	" " " "	25	N	8	8	8	8	1	120	1	
278	" " " "	30	N	8	8	8	8	1	73		
279	" " " "	30	N	8	8	8	8	1	81		
280	" " " catching	30	N	12	12	12	12	1	112		

281	Base-ball; catching and throwing	30	N	9	.	.	.	.	157
282	" " " "	30	N	10	.	.	10	8-4	150
283	" " " "	30	N	12	.	12	.	3-4	77
284	" " " "	30	N	12	.	.	12	1	201
285	" " " "	30	N	12	.	.	12	1	170
286	" " " "	25	N	12	.	.	12	1	105
287	throwing	26	N	11	.	.	11	1	75
288	running and picking up ball	30	N	10	.	.	10	1	108
288	error	30	N	10	.	12	.	1	16
289	Cricket; round arm bowling	69	N	.	.	12	.	1	2
290	" " " "	69	N	.	.	12	.	1	2
291	" " " "	69	N	.	.	12	.	1	2
292	" " " "	69	N	.	.	12	.	1	2
293	" " " "	69	N	.	.	12	.	1	2
294	Lawn tennis; serving	25	N	10	.	.	10	1	101
295	" " " "	15	D	8	.	8	.	8-4	210
296	" " " "	15	D	8	.	8	.	1	152
297	" " " "	15	D	8	.	8	.	1	170
298	" " " "	15	D	7	.	7	.	1	168
299	Playing with a ball	15	D	24	.	.	.	.	7
300	Foot-ball; drop kick	63	N	12	.	10	.	1	238
301	" " " "	63	N	12	.	11	.	1	141
302	Picking up a ball and throwing it	39	N	12	.	12	.	1	146
303	" " " "	8	N	12	.	12	.	1	178
304	" " " "	7	N	10	.	10	.	1	310
305	" " " "	12	T.D.	12	.	12	.	1	213
306	" " " "	7	T.D.	12	.	12	.	1	320
307	Throwing an iron disk	30	N	12	.	.	12	1	184
308	" " " "	39	N	11	.	.	11	1	249
309	" " " "	35	N	8	.	.	8	1	117
310	Putting the shot	68	N	12	.	12	.	1	2
311	Heaving 75-lb. rock	22	N	12	.	.	.	1	111

Serial No.	MOVEMENTS.	Model.	Costume.	Laterals.	Foreshortenings.				Quantity.	Time.	Notes.
					Front.		Rear.				
					90°	60°	90°	60°			
312	Heaving a 75-lb. rock	39	N	12	12	.	.	.	1	390	.
313	" 20-lb. "	46	N	10	10	.	10	.	1	145	.
314	" "	46	N	10	10	.	.	.	1	160	.
315	" "	35	N	12	12	.	.	.	1	104	.
316	" "	35	N	12	12	.	12	.	1	96	.
317	" 75-lb. "	52	P C	12	12	.	.	12	1	489	.
318	Lifting " "	42	P C	12	12	.	.	.	1	119	.
319	Heaving " "	42	P C	12	12	.	.	.	1	182	.
320	Lifting 50-lb. dumb-bell	52	P C	12	12	.	.	.	1	325	.
321	A, lifting 50-lb. dumb-bell; B, posing	42	P C	12	12	.	.	.	1	.	.
322	Lifting and letting down two 50-lb. dumb-bells	42	P C	24	24	.	.	.	1	.	4
323	" " " "	42	P C	12	12	.	.	.	1	.	.
324	" " " "	42	P C	12	12	.	.	12	1	398	.
325	Curling 50-lb. dumb-bell, model $\frac{3}{4}$ length	42	P C	10	10	.	.	.	1	488	.
326	Lifting and holding two 50-lb. dumb-bells	39	N	12	12	.	.	.	1	308	.
327	Lifting 50-lb. dumb-bell at arm's length	30	N	12	12	.	.	12	1	356	.
328	Rowing	68	N	12	12	.	12	12	1	233	.
329	" " " "	68	N	12	12	.	12	12	1	.	2
330	Boxing; (shoes)	52, 53	P C	12	12	.	12	12	1	167	.
331	" cross-counter (shoes)	52, 53	P C	12	12	.	12	12	1	98	.
332	" stop for cross-buttocks (shoes)	52, 53	P C	10	10	.	10	10	1	176	.
333	" cross-buttocks (shoes)	52, 53	P C	12	12	.	12	12	1	163	.
334	" 58 knocking 52 down (shoes)	52, 53	P C	12	12	.	12	12	1	96	.
335	" with gloves (shoes)	52, 53	P C	12	12	.	12	12	1	188	.
336	" " " "	52, 53	P C	12	12	.	12	12	1	115	.
337	" open hand " "	64, 65	P C	12	12	.	.	.	1	.	2
337	" " " "	64, 65	P C	12	12	.	.	9	1	.	2, 11

338	{ Boxing; open hand (shoes)	64, 65	P C	12	1	217
339	{ " " " "	64, 65	P C	12	1	217
340	{ " " " "	64, 65	P C	12	1	162
341	{ " " " "	64, 65	P C	8	1	162
342	{ " " " "	64, 65	P C	8	1	124
343	Striking a blow (left hand)	22	N	12	1	112
344	" " (right hand)	22	N	12	1	112
345	{ Wrestling; lock	46, 68	N	12	1	2
346	{ " " " "	46, 68	N	12	1	2
347	{ " " " "	46, 68	N	12	1	2
348	{ " " " "	46, 68	N	12	1	2
349	{ " " " "	46, 68	N	12	1	2
350	{ Fencing	66, 67	P C	12	1	4
351	{ " " " "	66, 67	P C	12	1	4
352	{ " " " "	66, 67	P C	12	1	4
353	{ " " " "	66, 67	P C	12	1	4
354	{ " " " "	66, 67	P C	12	1	4
355	{ " " " "	66, 67	P C	12	1	4
356	{ " " " "	66, 67	P C	12	1	4
357	{ " " " "	66, 67	P C	12	1	4
358	{ " " " "	66, 67	P C	12	1	4
359	{ " " " "	66, 67	P C	12	1	4
360	{ " " " "	66, 67	P C	12	1	4
361	{ " " " "	66, 67	P C	12	1	4
362	{ " " " "	66, 67	P C	12	1	4
363	{ " " " "	66, 67	P C	12	1	4
364	{ " " " "	66, 67	P C	12	1	4
365	{ " " " "	66, 67	P C	12	1	4
366	{ " " " "	66, 67	P C	12	1	4
367	{ " " " "	66, 67	P C	12	1	4
368	{ " " " "	66, 67	P C	12	1	4

Serial No.	MOVEMENTS.	Model.	Costume.	Laterals.	Foreshortenings.				Quantity.	Time.	Notes.
					Front.		Rear.				
					90°	60°	90°	60°			
369	{ First ballet action }	46	N	12	.	.	.	1	239	.	
370	{ " " " " " " " " " " }	46	N	12	12	.	12	1	239	.	
371	{ Acrobat, vertical "press up" }	42	PC	12	.	.	.	1	383	.	
372	{ " horizontal "press up" }	42	PC	12	.	.	.	1	475	.	
373	{ " "press up" from chair }	42	PC	8	.	.	8	1	363	.	
374	{ Blacksmiths, two models, hammering on anvil }	59, 61	PC	12	.	.	.	1	133	.	
375	{ " " " " " " " " " " }	59, 61	PC	12	12	.	12	1	133	.	
376	{ Blacksmith, hammering on anvil, two hands }	44	N	12	.	.	.	3-4	123	.	
377	{ Blacksmiths, two models, hammering on anvil }	44, 45	N	12	.	.	.	1-2	122	.	
378	{ Blacksmith, hammering on anvil, two hands }	61	PC	10	10	.	10	1	135	1, 22	
379	{ Carpenter, planing a board }	59	PC	12	12	.	12	1	126	.	
380	{ " sawing " }	59	PC	8	.	.	8	1	93	.	
381	{ Mason, laying a brick }	48	PC	8	.	.	8	1	211	.	
382	{ Lifting a log on end }	39	N	10	10	.	10	1	226	.	
383	{ Lifting a log on shoulder }	39	N	12	.	.	12	1	254	.	
384	{ Heaving a log from shoulder }	39	N	9	.	.	9	1	140	.	
385	{ Farmer, using a pick }	41	N	12	12	.	12	1	198	.	
386	{ Miner, " " }	57	D	24	.	.	.	1	139	.	
387	{ Farmer, using a long-handled shovel }	41	N	12	12	.	12	1	334	.	
388	{ " " spade }	41	N	12	12	.	12	1	353	.	
389	{ " scattering seed }	41	N	12	.	.	.	1	98	.	
390	{ " mowing grass }	41	N	12	.	.	.	3-4	138	.	
391	{ " " " " " " " " " " }	41	N	12	.	.	.	3-4	125	.	
392	{ Dragging a garden roller }	39	N	12	12	.	12	1-2	67	.	
393	{ Pushing " " }	39	N	12	.	.	.	1-2	73	.	
394	{ Turning a crank handle }	47	N	12	.	.	.	1	186	.	

395	Turning a crank handle	47	N	12	12	200
396	Pounding with a mallet	39	N	9	9	260
397	Lifting 75-lb. stone on shoulder	47	N	12	12	364
398	Lifting bucket of water to empty it	41	N	12	12	198
399	Emptying bucket of water	39	N	12	12	209
400	“ “ “ “ “ “ “ “ “ “	41	N	12	12	202
401	“ “ “ “ “ “ “ “ “ “	2	N	12	12	222
402	“ “ “ “ “ “ “ “ “ “	8	N	12	12	301
403	“ “ “ “ “ “ “ “ “ “	4	D	24	12	118
404	“ “ “ “ “ “ “ “ “ “	4	D	12	12	212
405	Carrying hod of bricks up a ladder	59	P	8	8	172
406	{ Two models, 8 pouring bucket of water over 1	1,8	C	12	12	285
407	{ “ “ “ “ “ “ “ “ “ “	1,8	N	12	12	285
408	Two “ “ “ “ “ “ “ “ “ “	1,8	N	9	9	437
409	Pouring basin of water over head	8	N	12	12	244
410	Stepping out of bath-tub, sitting down, wiping feet	8	N	12	12	335
411	Lifting a towel while sitting, and wiping feet	7	N	11	11	298
412	Washing, wiping face, and turning	8	N	9	9	443
413	Pouring water in basin and washing face	8	N	8	8	546
414	Wiping body with towel	8	N	12	12	213
415	Toilet; preparing to put on clothing	7	N	10	10	188
416	“ “ “ “ “ “ “ “ “ “	13	N	12	12	241
417	“ “ “ “ “ “ “ “ “ “	1	S	12	12	344
418	“ “ “ “ “ “ “ “ “ “	8	N	12	12	455
419	“ “ “ “ “ “ “ “ “ “	9	N	12	12	297
420	“ “ “ “ “ “ “ “ “ “	12	S	12	12	238
421	“ “ “ “ “ “ “ “ “ “	12	S	12	12	215
422	“ “ “ “ “ “ “ “ “ “	3	D	9	9	495
423	“ “ “ “ “ “ “ “ “ “	12	S	12	12	285
424	“ “ “ “ “ “ “ “ “ “	3	D	12	12	217

Serial No.	MOVEMENTS.	Model.	Costume.	Laterals.	Foreshortenings.				Quantity.	Time.	Notes.
					Front.		Rear.				
					90°	60°	90°	60°			
425	Toilet; putting on dress and turning around	7	N	8				8	1	322	
426	" brushing her hair and walking off	7	N	12	12			12	1	343	
427	{ two models, 1 disrobing 8	1, 8	N	12					1	307	
428	{ " " 1 " 8	1, 8	N					12	1	307	
429	" " 1 " 8	1, 8	N	6				8	1	470	
430	" taking off clothing	13	N	12	12			12	1	274	
431	" "	1	N	12	12			12	1	270	
432	Washing clothes at tub	8	N	12	12			12	1	235	
433	Wringing clothes	1	N	12	12			12	1	199	
434	Hanging clothes on line	8	N	12	12			12	1	244	
435	Ironing clothes	8	N	12	12			12	1	295	
436	Making up a bed	8	N	12	12			12	1	312	
437	Setting down bucket and preparing to sweep	3	D	12	12			12	1	208	
438	" " " scrub	3	D	12	12			12	1	318	1
439	Spreading a rug on the floor	8	N	12	12			12	1	339	
440	Stooping, and rinsing tumbler	4	N	10	10			10	1	252	
441	Carrying vase and placing it on table	8	N	12	12			12	1	221	
442	Stooping, and rolling a stone on the ground	7	N	12	12			12	1	164	
443	Drinking from a goblet while standing	8	N	8	8			8	1	264	
444	Two models shaking hands and kissing each other	1, 8	N	8	8			8	1	154	
445	Two models, 8 drinking from water-jar on the shoulder of 1	1, 8	N	12	12			12	1	350	
446	Filling pitcher on the ground from water-jar	7	N	11	11			11	1	300	
447	Two models, 9 taking water-jar from shoulder of 10	9, 10	N	12	12			12	1	260	
448	Two models, 11 descending stairs with goblet meets 10 with bouquet	10, 11	N	11	11			11	1	229	

CATALOGUE OF PLATES.

449	Feeding a dog	8	N	12	12	1	222	1	222
450	Two models, 8 brings cup of tea, 1 takes cup and drinks	1, 8	N	12		1	321	1	321
451	Two models, 8 brings cup of tea, 1 takes cup and drinks	1, 8	N		12	1	321	1	321
452	Two models; 8 kneels, drinks from water-jar in hands of 1, and both walk off	1, 8	N	12		1	410	1	410
453	Two models, 8 kneels, drinks from water-jar in hands of 1, and both walk off	1, 8	N		12	1	410	1	410
454	Taking 12-lb. basket from head and placing it on the ground	7	B F	10	10	1	211	1	211
455	Throwing self on heap of hay	7	B F	9	9	1	230	1	230
456	Raking hay	7	D	12	12	1	215	1	215
457	Stepping on chair, and reaching up	8	D	12	12	1	263	1	263
458	Lifting handfuls of hay, turning, throwing it down	7	B F	10	10	1	212	1	212
459	Stepping on chair, reaching up, and descending	1	T D	12	12	1	365	1	365
460	Carrying jar on shoulder and basket in hand, and placing them on the ground	7	B F	12	12	3-4	274	1	274
461	Opening a parasol, and turning around	12	T D	12	12	1	151	1	151
462	Pouring libation on ground, drinking from goblet	12	T D	12	12	1	332	1	332
463	Reaching up, stooping, and turning around	7	T D	12	12	1		1	2
464	Two models, 16 chasing 4 with a broom	4, 16	D	16		1	81	1	81
465	{ Two " child, 70 N, bringing bouquet to 12 }	70, 12	S N	12		1	291	1	291
466	{ " " " 70 N, " " 12 }	70, 12	S N		12	1	291	1	291
467	Child, walking	72	N	12	12	1	67	1	67
468	" " " "	71	N	12	12	1	85	1	85
469	" running	70	N	12		2	97	2	97
470	70 N, running after a man	51	D	12		1	57	1	57
471	" crawling on hands and knees	70	N	12	12	2	169	2	169
472	" " up-stairs	70	N	12		1	206	1	206
473	" walking up-stairs	70	N	12		1	161	1	161

Serial No.	MOVEMENTS.	Model.	Costume.	Laterals.	Foreshortenings.				Quantity.	Time.	Notes.
					Front.		Rear.				
					90°	60°	90°	60°			
474	Cb, walking up-stairs, kneeling, reaching for vase	70	N	12	.	.	.	12	1	348	.
475	“ getting up on chair	70	N	8	.	8	.	8	1	260	28
476	“ sitting down on the ground	72	N	12	.	12	.	.	1	105	.
477	“ stooping, lifting a goblet, and drinking	70	N	8	.	.	8	8	1	335	.
478	“ sprinkling water over some flowers	70	N	8	.	.	.	8	1	.	4
479	“ getting up from the ground	72	N	12	.	.	.	.	1	119	.
480	“ walking and crawling up-stairs	70	N	12	.	.	.	12	1	208	.
481	“ lifting a doll, turning, and walking off	70	D	12	.	.	.	.	1	182	.
482	A, walking; B, ascend'g stairs; C, ascend'g incline	7	N	36	.	.	.	.	.	.	2
483	A, lifting basket; B, running, waving handkerchief	3	D	20	.	.	.	.	.	.	2
484	A, sweeping; B, dusting a room	3	D	20	.	.	.	.	.	.	2
485	Two models; A 10, standing and filling a goblet; B 11, drinking while lying on the ground	10, 11	N	12	.	.	.	12	.	.	2
486	A, lawn tennis; B, ascending a ladder	102	N	44	.	.	.	.	.	.	2
487	A, ascending a step; B, lifting a handkerchief from the ground; C, walking; D, running	1	D	28	.	2	.	2	.	.	2, 3
488	A, lawn tennis; B, dumb-bells; C, walking on hands; D, ascending stairs	96	N	48	.	.	.	.	.	.	2
489	A, ascending incline; B, ascending incline with 50-lb. dumb-bell; C, descending incline; D, de- scending incline with 50-lb. dumb-bell	95	N	44	.	.	.	.	.	.	2
490	A, sitting down; B, sitting down; C, sprinkling water; D, stooping for cup and drinking	95	N	48	.	.	.	.	.	.	2
491	A, hammering at anvil; B, hammering at anvil; C, using hatchet; D, sawing a board	95	N	40	.	.	.	.	.	.	2

Serial No.	MOVEMENTS.	Model.	Costume.	Laterals.	Foreshortenings.				Quantity.	Time.	Notes.
					Front.		Rear.				
					90°	60°	90°	60°			
474	Child, walking up-stairs, kneeling, reaching for vase	70	N	12	.	.	12	1	348	.	
475	“ getting up on chair	70	N	8	.	8	8	1	260	28	
476	“ sitting down on the ground	72	N	12	.	12	.	1	105	.	
477	“ stooping, lifting a goblet, and drinking	70	N	8	.	.	8	1	335	.	
478	“ sprinkling water over some flowers	70	N	8	.	.	8	1	.	4	
479	“ getting up from the ground	72	N	12	.	.	.	1	119	.	
480	“ walking and crawling up-stairs	70	N	12	.	.	12	1	208	.	
481	“ lifting a doll, turning, and walking off	70	D	12	.	.	.	1	182	1	
482	A, walking; B, ascend'g stairs; C, ascend'g incline	7	N	86	.	.	.	.	.	2
483	A, lifting basket; B, running, waving handkerchief	8	D	20	.	.	.	.	.	2
484	A, sweeping; B, dusting a room	8	D	20	.	.	.	.	.	2
485	Two models; A 10, standing and filling a goblet; B 11, drinking while lying on the ground	10, 11	N	12	.	.	12	.	.	2	
486	A, lawn tennis; B, ascending a step; C, descending a step; D, ascending a ladder	102	N	44	.	.	.	.	.	2
487	A, ascending a step; B, lifting a handkerchief from the ground; C, walking; D, running	1	D	28	2	2	2	.	.	2, 3	
488	A, lawn tennis; B, dumb-bells; C, walking on hands; D, ascending stairs	96	N	48	.	.	.	.	.	2
489	A, ascending incline; B, ascending incline with 50-lb. dumb-bell; C, descending incline; D, de- scending incline with 50-lb. dumb-bell	95	N	44	.	.	.	.	.	2
490	A, sitting down; B, sitting down; C, sprinkling water; D, stooping for cup and drinking	95	N	48	.	.	.	.	.	2
491	A, hammering at anvil; B, hammering at anvil; C, using hatchet; D, sawing a board	95	N	40	.	.	.	.	.	2

Serial No.	MOVEMENTS.	Model.	Costume.	Laterals.	Foreshortenings.				Quantity.	Time.	Notes.
					Front.		Rear.				
					90°	60°	90°	60°			
521	A, walking; B, ascending step; C, throwing disk; D, using shovel; E, using pick; F, using pick.	95	N	12	6	6	6	6	.	3	
522	A 97, jumping; B 98, hand-spring; C 98, somersault; D 99, somersault; E 99, spring over man's back.	97-8-9	N	10	5	5	5	5	.	3	
523	A, striking a blow; B, throwing disk; C, heaving a 75-lb. stone; D, throwing a ball; E, throwing disk; F, heaving 75-lb. stone.	99	P C	12	6	6	6	6	.	3	
524	A, throwing water from bucket; B, descending step; C, ascending step; D, lawn tennis.	1	S N	8	4	4	4	4	.	3	
525	A, descending step; B, ascending step; C, descending step; D, ascending step; E, waving hand; chief	1	N	10	5	5	5	5	.	3	
526	A, lifting ball; B, emptying bucket of water; C, kicking above her head; D, striking with a stick; E, stumbling; F, lifting 50-lb. dumb-bell.	1	N	12	6	6	6	6	.	3	
527	A, B, C; 1, spanking child 104.	1	N	6	3	3	3	3	.	3	
528	A, B, C; 1, carrying child 104; D, walking with child 104, hand in hand; E, running with child 104, hand in hand.	1	N	5	5	5	5	5	.	3	
529	Various poses.	68	N	10	10	10	10	10	.	3	
530	"	46	N	10	10	10	10	10	.	3	
531	"	7	N	11	11	11	11	11	.	3	
532	Movement of the hand; drawing a circle	51	.	12	12	12	12	12	1	124	
533	" " clapping hands.	51	.	12	12	12	12	12	1	131	
534	" " lifting a ball.	51	.	12	12	12	12	12	1	175	
535	" " beating time.	51	.	12	12	12	12	12	1	168	
536	" " hands changing pencil.	51	.	12	12	12	12	12	1	178	

ABNORMAL MOVEMENTS.

537	Single amputation of leg; hopping with crutches	82	N	12	12	1	121	..
538	Double amputation of thighs; boy; A, moving forward; B, getting on chair; C, down from chair.	94	N	36	..	..	..	2
539	Infantile paralysis; child, walking on hands and feet	92	N	12	..	..	..	2
540	A, bow-legs; boy; B, spinal caries; girl, walking.	90, 91	N	24	..	..	..	2
541	Multiple cerebro-spinal sclerosis (choreic); walking	21	N	11	11	1	222	18
542	" " walking	17	S N	12	..	12	115	..
543	Spastic gait (hysterical); walking	19	S N	12	..	12	157	..
544	Artificially-induced convulsions; A, B, C, while lying	1	N	36	..	..	150	1
545	Artificially-induced convulsions; A, B, while sitting	1	N	24	..	..	180	1
546	Locomotor ataxia; walking	87	N	12	..	12	117	6
547	Hemiplegia; walking with crutch	81	N	12	..	12	227	..
548	Lateral sclerosis; A, B, walking	86	N	24	12	11	124	1,6
549	Epilepsy; walking	79	N	12	..	12	90	1
550	Locomotor ataxia; walking; A, arms down; B, arms up	84	N	20	..	20	164	1
551	Epilepsy; walking	78	N	12	12	2	214	..
552	Hemiplegia; walking with cane	76	N	12	12	1	128	..
553	After traumatism of head; walking	75	N	10	10	5-8	122	..
554	Locomotor ataxia; walking	83	N	11	..	11	118	..
555	Muscular atrophy of legs; adult; A, B, walking.	89	N	24	..	1	124	1
556	Local chorea; A, B, while lying.	74	N	22	..	..	52	1
557	" " A, B, C, while standing	74	N	36	..	..	48	1
558	Paraplegia; partial; walking	80	N	12	..	12	87	..
559	Disseminated sclerosis; walking with cane	88	N	12	12	12	108	2
560	Locomotor ataxia; walking	85	S N	12	12	7-8	108	6
561	Hydrocephalus; walking	77	N	12	12	1	213	..
562	Lateral curvature of spine; walking	89	N	12	..	8-4	62	..

587	Walking; sulky; sorrel mare	Nellie Rose	12	12	1-2	54
588	" bay horse	Reuben	12	12	5-8	82
589	Ambling (single foot); bareback; white horse	Clinton	12	12	1	52
* 590	Ambling (single foot); bareback; rider, 106, nude; white horse	Clinton	12	12	1	55
591	Racking (pacing); saddle; brown horse	Pronto	12	12	1	26
592	" " " "	"	12	12	1	51
593	" " " "	"	12	12	1	59
594	" " " "	"	12	12	11-2	74
595	" sulky; " "	"	12	12	11-2	76
-596	" " " "	"	12	12	3-4	45
597	Trotting; free; light-gray horse	Eagle	12	12	3-4	35
598	" bareback; dark-gray Belgian horse	Hansel	20	20	1	2
599	" saddle; bay horse	Daisy	20	20	1-2	56
600	" bareback; dark-gray Belgian horse	Dusel	12	12	1-2	52
601	" " " "	"	12	12	1	52
602	" saddle; brown mare	Beauty	12	12	3-4	48
603	" bareback; rider, 43, nude; light-gray horse	Smith	12	12	3-4	45
604	" saddle; rider, 43, nude; light-gray horse	Smith	10	10	3-4	16
605	" saddle; white horse	Elberon	12	12	1	46
606	" sulky; bay horse	Reuben	12	12	1-2	51
607	" " " "	"	12	12	1-2	34
608	" " mare	Lizzie M.	24	24	5-8	17
609	" " sorrel mare	Flode Holden	24	24	5-8	23
610	" " bay mare	Lizzie M.	24	24	5-8	19
611	" " gray mare	Katydid	12	12	11-2	70
612	" " " "	"	12	12	11-4	52
613	" " bay horse	Dereun	12	12	3-4	47
614	" " sorrel mare	Nellie Rose	12	12	7-8	47
	" " breaking to gallop; sorrel mare	Flode Holden	24	24	7-8	21

639	Jumping a hurdle; saddle; bay horse	Daisy	20	1	2
640	“ “ “ “ “	“	20	1	2
641	Jumping a hurdle; saddle; knocking over hurdle and landing; rider 105; gray mare	Pandora	12	.	64
642	Jumping a hurdle; saddle; rider, 105, nude; gray mare	Pandora	20	1	60
643	Jumping a hurdle; bareback; clearing and landing; rider, 105, nude; gray mare	Pandora	12	.	60
644	Jumping a hurdle; saddle; clearing and landing; knocking over hurdle; rider 105; gray mare	Pandora . . . . .	.	8	149
645	Jumping a hurdle; saddle; clearing and landing; rider 105; gray mare	Pandora . . . . .	.	8	155
646	Jumping a hurdle; saddle; rider, 105, nude; gray mare	Pandora	12	12	122
347	Jumping a hurdle; bareback; rider, 105, nude; gray mare	Pandora . . . . .	.	12	120
348	Jumping over three horses; A, B; chestnut horse	Pandora	24	1	2
349	A, Hornet, rocking; B, Eagle, rolling barrel, etc.	Hornet	18	.	2
350	Walking with a bucket in mouth; light-gray horse	Eagle	12	.	78
651	A, bell ringing; B, teeter board; C, military drill . . . . .	.	12	.	4
652	A, B, C, D, E, horses rearing, etc. . . . .	.	30	.	4
653	Walking; saddle; lame, right front foot; horse	Buckskin	12	1	116
654	“ “ “ “ “	“	12	1	104
655	Walking; saddle; spavin, right hind leg; horse	Gazelle	12	1	99
656	Walking; free; ossification of cartilage, right front foot; horse	Bob	12	1	101
657	Rolling a box; pony	Lotta	12	1	2

Serial No.	ANIMALS AND MOVEMENTS.	Laterals.	Foreshortenings.				Quantity.	Time.	Notes.
			Front.		Rear.				
			90°	60°	90°	60°			
658	Mule; A, kicking; B, kicking	16	.	.	.	.	A, 62 B, 65	1
659	" A, B, bucking and kicking	16	.	.	.	.	A, 91 B, 90	1
660	" miscellaneous performances	26	.	.	.	.	.	4
661	" A, B, a refractory animal	24	.	.	.	.	.	2
662	" A, B, "	24	.	.	.	.	.	2
663	" A, B, "	24	.	.	.	.	.	4
664	" various performances; at a table, etc.	30	.	.	.	.	.	.
665	Ass; walking; bareback; a boy riding	12	.	.	.	.	.	94
666	" " saddle; a girl riding	20	.	.	.	.	.	36
667	" " a boy "	12	.	.	12	.	.	82	
668	" ambling; irregular; saddle; a boy riding	8	.	.	8	.	.	87	
669	Ox; walking	16	.	.	.	.	.	48
670	" "	12	12	.	.	.	.	123
671	" "	12	.	.	12	.	.	115	
672	" trotting	16	.	.	.	.	.	56
673	Sow; walking	12	12	.	.	.	.	77
674	" "	12	.	.	12	.	.	67	
675	" trotting	16	.	.	.	.	.	31
676	Goat; walking	16	.	.	.	.	.	43
677	" " in sulky	12	12	.	.	.	.	51
678	" trotting, in sulky	12	12	.	.	.	.	44
679	" galloping	24	.	.	.	.	.	29
680	Orex; galloping	10	.	.	.	.	.	59
681	Virginia deer; (no antlers;) buck; walking, startled to a gallop	12	.	.	12	.	.	.	

682	Fallow deer; buck; A, trotting; B, galloping	16	12	1	1	2
683	Virginia deer; (no antlers;) buck; galloping	24	12	1	1	2
684	Fallow deer; A, buck and doe; B, two does; trotting, galloping	16	12	1	1	2
685	“ “ buck and doe; trotting	“	12	1	1	2
686	“ “ “ galloping	“	12	1	1	2
687	“ “ group of does; galloping	“	12	1	1	2
688	“ “ “ “ “	“	12	1	1	2
689	“ “ A, B, buck, and group of does; galloping	16	12	1	1	2
690	“ “ buck and group of does; various movements	12	12	1	1	2
691	“ “ doe; galloping; and kid; jumping	12	12	1	1	2
692	Elk; trotting	20	12	1	1	2
693	“ galloping	20	12	1	1	2
694	“ “ irregular	8	12	1	1	2
695	“ “ “	8	8	1	1	2
696	Eland; trotting	12	12	1	1	2
697	Antelope; trotting	12	12	1	1	2
698	“ galloping	12	12	1	1	2
699	Buffalo; walking	24	12	1	1	2
700	“ galloping	16	12	1	1	2
701	Gnu; walking	10	12	1	1	2
702	“ bucking and galloping	10	12	1	1	2
703	Dog; walking; interrupted; mastiff	12	12	1	1	2
704	“ “ mastiff	“	12	1	1	2
705	“ trotting;	“	12	1	1	2
706	“ “ “	“	12	1	1	2
707	“ galloping; Smith	12	8	1	1	2
708	“ brown racing hound; Dread	10	10	1	1	2
709	“ white “ Ike	12	12	1	1	2
710	“ “ “ Maggie	12	12	1	1	2
711	Dogs; two, racing; A, B; racing hounds . Ike, Maggie	“	12	1	1	2

A, 42
B, 37

Serial No.	ANIMALS AND MOVEMENTS.	Laterals.	Foreshortenings.				Quantity.	Time.	Notes.
			Front.		Rear.				
			90°	60°	90°	60°			
712	Dog; jumping hurdle; mastiff		12	12	12	12	1	2	
713	" turning around, etc.; setter	12	12	12			174		
714	" aroused by a torpedo; mastiff	12					95	2	
715	Dogs; three, tugging at a towel	12					31		
716	Cat; walking; change to galloping	24					30		
717	" trotting; "	20					35		
718	" " "	24					28		
719	" galloping	20					17		
720	" "	24					76		
721	Lion; walking	12	9				75		
722	" "						114		
723	" " turning around		12				119		
724	" " "			12			186	1	
725	" " "				12		114	1	
726	" and lioness; walking	12					125		
727	Lioness; walking; lion; lying down	12					125		
728	" "	12					75		
729	Tigress; "	12					119		
730	" " turning around		12				A144		
731	Jaguar; A, walking; B, turning around	24					B129		
732	Elephant; walking	16					68	1	
733	" "	24					36		
734	Elephants; two, walking		12				92		
735	" "			12			86		
736	Egyptian camel; racking	16					24		

737	Bactrian camel; walking	16	16	1-2	57
738	" racking	16	16	3-4	37
739	" galloping	20	20	1	29
740	" (young), galloping	20	20	1	32
741	" A, walking; B, racking			{	{ A, 91 B, 58
742	" A, racking; B, galloping			{	{ A, 133 B, 39
743	Guanaco; galloping	12	12		2
744	Raccoon; walking; change to galloping	24	24		32
745	" and turning around	20	20		32
746	Capybara; walking		9	1-2	2
747	Baboon; walking on all-fours	16	16	1	45
748	" "	24	24	1 1-2	42
749	" climbing a pole	12	12	3-4	41
750	Sloth; walking suspended on a horizontal pole	12	12	3-4	2
751	Kangaroo; walking on all-fours; change to jumping	11	11		2
752	" jumping	12	12	1	69
753	" "	12	12	1	64
754	" "		12	1	66
BIRDS AND MOVEMENTS.					
755	Pigeon; flying	12	12	1 3-4	19
756	" "	12	12	2	21
757	" "	12	12	1 1-2	20
758	Cockatoo; flying	24	24	2	28
759	" "	24	24	2	17
760	" "		20	1 1-2	16
761	" "		16	1 1-2	24
762	" "		12	3	75
763	Red-tailed hawk; flying	24	24	2 1-2	19

Serial No.	BIRDS AND MOVEMENTS.	Laterals.		Foreshortenings.				Quantity.	Time.	Notes.
				Front.		Rear.				
		90°	60°	90°	60°	90°	60°			
'64	Fish hawk; flying	10	.	.	.	.	.	2	58	.
'65	Vulture; flying	24	.	.	.	.	.	11-4	19	.
'66	"	24	.	.	.	.	.	21-4	34	.
'67	"	12	.	.	.	.	.	11-4	40	.
'68	"	12	.	12	.	.	.	11-4	40	.
'69	American eagle; flying	10	.	.	.	.	.	1	40	.
'70	" " near the ground	24	.	.	.	.	.	2	21	.
'71	" "	.	.	24	.	.	.	11-2	19	.
'72	Ostrich; walking	12	.	.	.	12	.	1	91	.
'73	" running	12	.	.	.	12	.	3-4	52	.
'74	Adjutant; walking	12	.	.	.	.	.	5-8	.	.
'75	" flying run	10	.	.	.	.	.	1-2	.	.
'76	Storks; swans, etc., A, B, C	18	.	.	.	.	.	.	.	.
'77	" etc., A, B, C, D.	24	.	.	.	.	.	.	.	.
'78	" " A, B, C	15	.	.	.	.	.	.	.	.
'79	" swans, etc.	12	.	.	.	.	.	.	.	.
'80	" "	12	.	.	.	.	.	.	.	.
'81	Chickens; scared by torpedo	.	.	12	.	.	.	.	.	.

